



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

April 16, 2021

Mr. David Rhoades
Senior VP, Exelon Generation Company, LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: BRAIDWOOD STATION – INTEGRATED INSPECTION REPORT
05000456/2021001 AND 05000457/2021001**

Dear Mr. Rhoades:

On March 31, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Braidwood Station. On April 1, 2021, the NRC inspectors discussed the results of this inspection with Mr. J. Keenan, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement; and the NRC Resident Inspector at Braidwood Station.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; and the NRC Resident Inspector at Braidwood Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Hironori Peterson, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 05000456 and 05000457
License Nos. NPF-72 and NPF-77

Enclosure:
As stated

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Letter to David Rhoades from Hironori Peterson dated April 16, 2021.

SUBJECT: BRAIDWOOD STATION – INTEGRATED INSPECTION REPORT
05000456/2021001 AND 05000457/2021001

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 05000456 and 05000457

License Numbers: NPF-72 and NPF-77

Report Numbers: 05000456/2021001 and 05000457/2021001

Enterprise Identifier: I-2021-001-0019

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station

Location: Braceville, IL

Inspection Dates: January 01, 2021 to March 31, 2021

Inspectors: R. Bowen, Illinois Emergency Management Agency
J. Bozga, Senior Reactor Inspector
G. Edwards, Health Physicist
M. Garza, Emergency Preparedness Inspector
D. Kimble, Senior Resident Inspector
P. Smagacz, Resident Inspector

Approved By: Hironori Peterson, Chief
Branch 3
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Braidwood Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

LER 2020-001-00 for Braidwood Station, Unit 1, Train A Auxiliary Feedwater Pump was Inoperable Due to a Failed Suction Pressure Lead/Lag Card			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456/2021001-01 Closed	[H.1] - Resources	71153
A self-revealed finding of very low safety significance and an associated non-cited violation (NCV) of Technical Specification (TS) 3.7.5, "Auxiliary Feedwater (AF) System," were identified when the licensee operated Braidwood Unit 1 with the 1 A AF Pump and its associated suction pressure instrument, 1PT-AF051, in an inoperable condition for longer period of time than allowed by the station's Technical Specifications. Specifically, on October 3, 2020, a shiftly channel check identified that the deviation between the 1A and 1B AF Pump suction pressures exceeded the deviation for the channel check acceptance criteria. Further investigation by the licensee revealed that the 1A AF suction pressure indication had failed at a constant value on September 17, 2020.			

Additional Tracking Items

None.

PLANT STATUS

Unit 1 began the inspection period operating at full power. On March 12, 2021, the unit reached the end of the fuel cycle and power coast down operations commenced in preparation for a planned refuel outage. The unit continued to reduce power in accordance with the licensee's approved reactivity management plan, and was operating at approximately 89 percent power at the end of the inspection period.

Unit 2 began the inspection period operating at full power. With the exception of minor reductions in power to support scheduled testing activities and load changes requested by the transmission system dispatcher, the unit remained operating at or near full power for the entire inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the Coronavirus Disease 2019 (COVID-19), resident inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time, the resident inspectors performed periodic site visits each week; conducted plant status activities as described in IMC 2515, Appendix D, "Plant Status"; observed risk-significant activities; and completed on-site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or portions of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on-site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from an impending winter storm moving through northeast Illinois on January 25 and 26, 2021.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated system configurations during partial physical alignment verifications of the following systems/trains:

- (1) The 1B Safety Injection (SI) Train while the 1A SI Train was out of service for maintenance during the week ending January 9, 2021.
- (2) The 1A SI Train while the 1B SI Train was out of service for maintenance during the week ending January 23, 2021.
- (3) The 2A AF Train while the U0 Component Cooling (CC) Heat Exchanger (HX) was undergoing a planned risk-significant maintenance window during the week ending January 30, 2021.
- (4) The Unit 1, Division 11 and 12 125 Vdc safety-related batteries while the U0 CC HX was undergoing a planned risk-significant maintenance window during the weeks ending February 6 through February 13, 2021.

Complete Walkdown Sample (IP Section 03.02) (1 Partial)

The inspectors evaluated system configuration during a full system physical alignment verification of the following system/trains:

- (1) (Partial)
The inspectors performed the first part of a full system physical alignment verification of the Unit 1 Residual Heat Removal (RH) System during the weeks ending March 27 through March 31, 2021.

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (3 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting physical inspections and reviews to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) The Auxiliary Building 383' Elevation, General Area South while the fire protection system was undergoing maintenance during the week ending January 16, 2021.
- (2) The Auxiliary Building 364' Elevation, General Area North while the U0 CC HX was out of service for a risk-significant maintenance window during the week ending February 6, 2021.
- (3) The Lake Screen House while welding activities on essential service water (SX) components were underway during the week ending March 31, 2021.

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

The inspectors evaluated the performance and training of the on-site fire brigade during observation of the following drill activity:

- (1) An unannounced fire drill during the week ending February 27, 2021.

71111.07A - Heat Sink Performance

Annual Review (IP Section 03.01) (1 Sample)

The inspectors conducted a review that evaluated readiness and performance of the following safety-related HX:

- (1) The Unit 0 CC HX as set forth in Work Order (WO) 4757035 during the weeks ending January 30 through February 20, 2021.

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

The inspectors observed and evaluated the following licensed operator activities in the control room:

- (1) Various activities involving on-watch operations crews. These activities included, but were not limited to:
 - Restoration of Unit 2 letdown system pressure/temperature to automatic control from local-manual control during the week ending March 13, 2021.
 - Realignment of Unit 2 heater drains following maintenance activities during the week ending March 27, 2021.
 - Performance of the 2B Emergency Diesel Generator (EDG) 24-hour endurance surveillance load manipulations during the week ending March 27, 2021.

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

The inspectors observed and evaluated the following licensed operator training activity:

- (1) A complex casualty graded scenario involving a crew of licensed operators was observed in facility's simulator on March 16, 2021.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

- (1) Maintenance effectiveness and performance history review of chemical and volume control system (CVCS) filters during the weeks ending January 30 through March 20, 2021.
- (2) Maintenance effectiveness and performance history review of the 0SX115C valve and associated piping following the categorization of the station's essential service water (SX) system under 10 CFR 50.69 during the weeks ending March 6 through March 31, 2021.

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Evaluation of the planned work associated with new fuel receipt, as set forth in Work Order (WO) 4988286 during the weeks ending January 23 through February 6, 2021.
- (2) Evaluation of the planned work and the risk-informed completion time (RICT) associated with repairs to the Unit 0 CC HX, as set forth in WO 4757035 during the weeks ending January 23 through January 30, 2021.
- (3) Evaluation of the work activities and risk associated with emergent repairs to the Reactor Coolant (RC) Filter and associated valves in the Unit 2 letdown line, as set forth in WOs 5120762 and 5120805 during the week ending January 30, 2021.
- (4) Evaluation of the planned work and the RICT associated with repairs to the Unit 1 CC HX, as set forth in WO 1478802 during the weeks ending February 6 through February 20, 2021.

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (2 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) Evaluation of the operability of the 1B EDG following identification of a degraded hydraulic lifter on the 10L engine cylinder, as documented in Issue Report (IR) 4395932 during the weeks ending January 23 through January 30, 2021.
- (2) Evaluation of the operability of AF system components following ultrasonic testing issues on the safety-related SX supply piping to AF, as documented in IR 446038 during the weeks ending March 6 through March 13, 2021.

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Partial)

The inspectors reviewed and evaluated the following permanent change to the facility that was enacted on the Unit 1 and Unit 2 SX system. The inspectors' reviews included an in-depth examination of the licensee's use of 10 CFR 50.69, *Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors*, as it was applied to the SX system:

- (1) (Partial)
Engineering Change (EC) 632945: 0SX115C Valve and Piping Carbon Fiber Wrap, during the weeks ending March 3 through March 31, 2021.

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (3 Samples)

The inspectors evaluated the following post-maintenance test activities to verify system operability and functionality:

- (1) Functional and operational testing of the 2B EDG following corrective maintenance on the air starting system, as set forth in WOs 5126451 and 5120934 during the week ending February 20, 2021.
- (2) Functional and operational testing of the 2A EDG following replacement of kilovac relays, as set forth in WOs 5086399 and 5127218 during the weeks ending February 27 through March 6, 2021.
- (3) Replacement and testing of Ovation™ logic controllers for the CVCS, as set forth in WO 5130977 during the week ending March 13, 2021.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (1 Sample)

- (1) 1BwOSR 3.8.1.2-2: Unit One - 1B Diesel Generator (DG) Operability Surveillance, during the weeks ending January 16 through January 23, 2021.

Inservice Testing (IP Section 03.01) (1 Sample)

- (1) 2BwOSR 5.5.8.RH-5B: Group A Inservice Testing (IST) Requirements for the 2B RH Pump (2RH01PB), during the week ending January 16, 2021.

RCS Leakage Detection Testing (IP Section 03.01) (1 Sample)

- (1) Assessment of unidentified Reactor Coolant System (RCS) leakage rate on Unit 1, as documented in IRs 4344110, 4344858, 4345453, and 4345579, during the weeks ending January 9 through February 6, 2021.

71114.02 - Alert and Notification System Testing

Inspection Review (IP Section 02.01-02.04) (1 Sample)

- (1) The inspectors evaluated the following maintenance and testing of the alert and notification system:
 - 2019 PNS System Maintenance Report
 - 2020 PNS System Maintenance Report

71114.03 - Emergency Response Organization Staffing and Augmentation System

Inspection Review (IP Section 02.01-02.02) (1 Sample)

- (1) The inspectors evaluated the readiness of the Emergency Preparedness Organization.

71114.05 - Maintenance of Emergency Preparedness

Inspection Review (IP Section 02.01 - 02.11) (1 Sample)

- (1) The inspectors evaluated the maintenance of the emergency preparedness program.

71114.06 - Drill Evaluation

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

The inspectors evaluated site's emergency plan by observing the following activity:

- (1) Implementation of the site's emergency plan by a crew of licensed operators during an evaluated emergency scenario in the facility's simulator on March 16, 2021.

RADIATION SAFETY

71124.02 - Occupational ALARA Planning and Controls

Radiological Work Planning (IP Section 03.01) (4 Samples)

The inspectors evaluated the licensee's radiological work planning.

- (1) Reactor Disassembly and Reassembly during the spring 2020 refueling outage (A2R21).
- (2) Reactor Head/Upper Internal Moves during A2R21.
- (3) Nuclear Instrumentation Under-Vessel Activities during A2R21.
- (4) 2 Alpha Reactor Coolant Pump Motor/Pump Replacement during A2R21.

Verification of Dose Estimates and Exposure Tracking Systems (IP Section 03.02) (4 Samples)

The inspectors evaluated dose estimates and exposure tracking.

- (1) Radiation Work Permit BW-02-20-00613 and Associated ALARA Documentation for Reactor Disassembly and Reassembly during the spring 2020 refueling Outage (A2R21).
- (2) Radiation Work Permit BW-02-20-00614 and Associated ALARA Documentation for Reactor Head/Upper Internal Moves during A2R21.
- (3) Radiation Work Permit BW-02-20-00619 and Associated ALARA Documentation for Nuclear Instrumentation Under-Vessel Activities during A2R21.
- (4) Radiation Work Permit BW-02-20-00645 and Associated ALARA Documentation for 2 Alpha Reactor Coolant Pump Motor/Pump Replacement during A2R21.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors reviewed and verified selected portions of the licensee's performance indicator submittals listed below:

EP01: Drill/Exercise Performance (IP Section 03.12) (1 Sample)

- (1) Unit 1 (January 1, 2020 through December 31, 2020)
Unit 2 (January 1, 2020 through December 31, 2020)

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 03.01) (2 Samples)

- (1) Unit 1 (January 1, 2020 – December 31, 2020)
- (2) Unit 2 (January 1, 2020 – December 31, 2020)

EP02: ERO Drill Participation (IP Section 03.13) (1 Sample)

- (1) Unit 1 (January 1, 2020 through December 31, 2020)
Unit 2 (January 1, 2020 through December 31, 2020)

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 03.02) (2 Samples)

- (1) Unit 1 (January 1, 2020 – December 31, 2020)
- (2) Unit 2 (January 1, 2020 – December 31, 2020)

EP03: Alert & Notification System Reliability (IP Section 03.14) (1 Sample)

- (1) Unit 1 (January 1, 2020 through December 31, 2020)
Unit 2 (January 1, 2020 through December 31, 2020)

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 03.03) (2 Samples)

- (1) Unit 1 (January 1, 2020 – December 31, 2020)
- (2) Unit 2 (January 1, 2020 – December 31, 2020)

71153 - Follow-up of Events and Notices of Enforcement Discretion

Event Follow-up (IP Section 03.01) (1 Sample)

The inspectors assessed licensee performance related to the following events:

- (1) Review and tracking of licensee actions during the COVID-19 National Emergency declaration, as set forth by the President of the United States during the weeks ending February 13 through March 31, 2021.

Event Report (IP Section 03.02) (1 Sample)

The inspectors evaluated and closed the following licensee event report (LER):

- (1) LER 05000456/2020-001-00, *Train A Auxiliary Feedwater Pump was Inoperable Due to a Failed Suction Pressure Lead/Lag Card* (ADAMS Accession No. [ML20330A155](#)). The inspection conclusions and specific details associated with the closure of this LER are documented in the Results Section of this report.

INSPECTION RESULTS

LER 2020-001-00 for Braidwood Station, Unit 1, Train A Auxiliary Feedwater Pump was Inoperable Due to a Failed Suction Pressure Lead/Lag Card			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456/2021001-01 Closed	[H.1] - Resources	71153
<p>A self-revealed finding of very low safety significance and an associated non-cited violation (NCV) of Technical Specification (TS) 3.7.5, "Auxiliary Feedwater (AF) System," were identified when the licensee operated Braidwood Unit 1 with the 1A AF Pump and its associated suction pressure instrument, 1PT-AF051, in an inoperable condition for longer period of time than allowed by the station's Technical Specifications. Specifically, on October 3, 2020, a shiftly channel check identified that the deviation between the 1A and 1B AF Pump suction pressures exceeded the deviation for the channel check acceptance criteria. Further investigation by the licensee revealed that the 1A AF suction pressure indication had failed at a constant value on September 17, 2020.</p>			
<p><u>Description:</u></p> <p>On October 3, 2020, control room operators conducting a shiftly channel check of Unit 1 AF suction pressure instruments identified that the difference between the Train A and Train B pump suction pressures exceeded the channel check acceptance criteria. The 1A AF Pump suction pressure indicated 37.9 psia, while the 1B AF Pump suction pressure indicated 40.3 psia. The 2.4 psia difference exceeded the specified acceptance criteria for the surveillance of 4 percent, or 2 psia. As part of the investigation that followed, the licensee examined historical data for the suction pressure instruments recorded on the plant process computer. This examination revealed that computer point P2301 for the 1A AF Pump suction pressure instrument had failed at a constant value back on September 17, 2020. Based on this information, at 10 a.m. on October 3, 2020, the licensee entered TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Limiting Condition for Operation (LCO) Conditions A and J. Condition J required the associated 1A AF Pump to be declared inoperable immediately, resulting in entry into TS LCO 3.7.5, "Auxiliary Feedwater (AF) System," Condition A for one AF train inoperable.</p> <p>Troubleshooting conducted by the licensee determined the 1A AF Pump and its associated suction pressure instrument, 1PT-AF051, were inoperable as of 7:31 p.m. on September 17, 2020, due to failed suction pressure lead/lag card (1PYAF051C). Because of the failed card, the 1A AF Pump was incapable of automatically transferring to its safety-related essential service water (SX) suction source if the normal suction source was lost. This transfer capability was, however, always available with operator action from the control room and the manual transfer of the AF pumps' suction source is a proceduralized action that licensed operators are trained to accomplish if the automatic transfer should fail when called upon. The failed lead/lag card was replaced and the 1A AF Pump and its associated suction pressure instrument were restored to operable status. All applicable TS LCO required actions were exited at 1:11 a.m. on October 4, 2020.</p> <p>The licensee determined that the failed lead/lag card not being identified from the time of failure at 7:31 p.m. on September 17, 2020, until discovery at 10 a.m. on October 3, 2020,</p>			

constituted a missed opportunity due to the manner in which the channel check surveillance was being performed. Ultimately, because the 1A AF Pump suction pressure instrument failed in a manner that continued to place its output in close proximity to the nominal value seen by both the 1A and 1B AF Pump suction pressure instruments, the simple comparison of output values was insufficient to permit timely identification of the failure.

Typically, issues found during TS surveillance tests are considered to have occurred at the time of the test unless there is substantive evidence to the contrary. Given that data from the plant process computer was able to trace the failure of the 1PYAF051C suction pressure lead/lag card to precisely 7:31 p.m. on September 17, 2020, there was clear indication that the unit had been operated at power in excess of the TS 3.7.5 required action completion times. As a result, the licensee reported this event in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's TS. The licensee reported this event to the NRC as LER 2020-001-00, *The Unit 1 Train A Auxiliary Feedwater Pump was Inoperable Due to a Failed Suction Pressure Lead/Lag Card*, on November 25, 2020, (ADAMS Accession Number ML20330A155).

Corrective Actions: The failed 1PYAF051C suction pressure lead/lag card for the 1A AF Pump was successfully replaced and the automatic transfer capability for the 1A AF suction source was restored. Additionally, the licensee added requirements to check the historical trends associated with the AF pump suction pressure instruments during channel check surveillances.

Corrective Action References: 4374128; *P2301 Indication Suspect*; 10/03/2020

Performance Assessment:

Performance Deficiency: The Bases for TS Surveillance Requirement (SR) 3.3.2.1 stipulates that the channel check surveillance ensures that a gross failure of instrumentation has not occurred. Further, the Bases stipulates that the channel check surveillance will detect gross channel failure, and thus, is key to verifying instrumentation continues to operate properly between required channel calibrations. The inspectors concluded that the licensee's failure to have performed a routine, shiftly channel check on the Unit 1 AF pump suction pressure instruments that was capable of detecting a gross failure of the 1A AF Pump suction pressure instrument constituted a performance deficiency that was within the licensee's ability to have foreseen and that should have been prevented.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding was associated with the Mitigating Systems Cornerstone of Reactor Safety and was determined to be of more than minor significance because it was associated with cornerstone attribute of procedure quality, and adversely affected the cornerstone objective: "To ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage)." Specifically, the inspectors determined that the licensee's failure to have implemented and performed a channel check on the Unit 1 AF pump suction pressure instruments that met the intent of the TS SR 3.3.2.1 Bases contributed to the missed opportunity to have identified the failure of the 1PYAF051C suction pressure lead/lag card in a timely manner. The inspectors also compared the finding with the examples listed in IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Example of Minor Issues." Example 3.d was found to be similar in

that a failure to have adequately executed a required TS SR adversely impacted the cornerstone objective and ultimately resulted in the 1A AF Pump being rendered inoperable for a period in excess of the TS 3.7.5 allowed required action completion time.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," the inspectors were able to answer "no" to all questions and determined the finding to be of very low safety significance (Green). More specifically, the inspectors concluded that probabilistic risk assessment (PRA) functionality of the Unit 1 AF system had not been lost during the time in question from September 17, 2020, to October 4, 2020, because:

- The redundant 1B AF Train was always available;
- Despite being incapable of automatically transferring to its safety-related essential service water (SX) suction source if the normal suction source was lost, the 1A AF Pump was fully capable of automatically starting and supplying AF from its normal source, the condensate storage tanks (CSTs), if demanded by any starting signal; and
- The 1A AF Pump could have been transferred to its safety-related SX suction source, if necessary, by plant operators using approved procedures and response actions to which they were trained.

Cross-Cutting Aspect: H.1 - Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Specifically, existing procedures used to perform the Unit 1 AF pump suction pressure instrument TS channel check surveillance were ineffective at detecting a gross failure of the instrumentation, as discussed in the TS SR Bases

Enforcement:

Violation: TS 3.7.5 requires that two AF trains be operable whenever a unit is operating in Modes 1, 2, or 3. Further, with one AF train inoperable, the inoperable train must be restored within 72 hours, or in accordance with an approved Risk Informed Completion Time (RICT), or the unit placed into Mode 4 where TS 3.7.5 no longer applies. Contrary to this requirement, the licensee operated Unit 1 at power in Mode 1 from September 17, 2020, at 7:31 p.m. to October 4, 2020, at 1:11 a.m. with the 1A AF Train inoperable due to a failed 1PYAF051C suction pressure lead/lag card for the 1A AF Pump.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On April 1, 2021, the inspectors presented the integrated inspection results to Mr. J. Keenan, Site Vice President, and other members of the licensee staff.
- On February 19, 2021, the inspectors presented the Radiation Protection Inspection results to Mr. J. Keenan, Site Vice President, and other members of the licensee staff.
- On March 5, 2021, the inspectors presented the Emergency Preparedness Program Inspection Exit Meeting inspection results to Ms. M. Spillie, Emergency Preparedness Manager, and other members of the licensee staff.

THIRD PARTY REVIEWS

As discussed in IMC 0611, Section 13.01, the inspectors completed a review of the January 13, 2021, report issued by the Institute of Nuclear Power Operations (INPO) National Academy for Nuclear Training (NANT) for their most recent evaluation of maintenance, technical, and engineering training programs at Braidwood Station.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Procedures	0BwOA ENV-1	Adverse Weather Conditions Unit 0	124
		OP-AA-102-102	General Area Checks and Operator Field Rounds	18
		OP-AA-108-111-1001	Severe Weather and Natural Disaster Guidelines	22
		OP-BR-102-102-1001	Augmented Operator Field Rounds	4
		WC-AA-107	Seasonal Readiness	22
71111.04	Corrective Action Documents	4362997	1SI01PA, 1A SI Pump Outboard Bearing has Boric Acid Buildup	08/13/2020
	Procedures	BwOP AF-E2	Electrical Lineup — Unit 2 Operating	11
		BwOP AF-M2	Operating Mechanical Lineup, Auxiliary Feedwater, Unit 2	18
		BwOP DC-E2	Electrical Lineup — Unit 1 Operating — 125V DC Division 11	9
		BwOP DC-E3	Electrical Lineup — Unit 1 Operating — 125V DC Division 12	8
		BwOP DC-E4	Electrical Lineup — Unit 1 Operating — 250V DC Distribution	2
		BwOP SI-E1	Electrical Lineup — Unit 1 Operating	12
BwOP SI-M1	Operating Mechanical Lineup	27		
71111.05	Corrective Action Documents	4405839	4.0 Critique Crew 4 Fire Drill	03/02/2021
	Fire Plans	Pre-Fire Plan 112	Fire Zone 11.3-0 North; Auxiliary Building 364' Elevation Unit 1 Auxiliary Building General Area — North	2
		Pre-Fire Plan 2	Fire Zone 8.3-1; Turbine Building 401' Elevation, Unit 1 Turbine Building Grade Level — Southwest	3
		Pre-Fire Plan 224	Fire Zone 18.12-0; Lake Screen House 602' Elevation	4
		Pre-Fire Plan 60	Fire Zone 8.3-1; Turbine Building 401' Elevation, Unit 1 Turbine Building Grade Level — Northwest	4
		Pre-Fire Plan 61	Fire Zone 8.3-1; Turbine Building 401' Elevation, Unit 1 Turbine Building Grade Level — Southeast	3
		Pre-Fire Plan No. 134	Fire Zone 11.4-0 South; Auxiliary Building 383' Elevation Unit 2 Auxiliary Building General Area South	3
	Miscellaneous	Fire Drill Scenario 20.18.09.24	Unit 1 Flammable Liquids Cabinet Fire	09/24/2018
Procedures	BwAP 1100-16	Fire/Hazardous Materials Spill and/or Injury Response	36	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		BwAP 1100-3	Fire Chief (Designated Field Supervisor) Implementing Procedure	4
		BwAP 1100-4	Fire Brigade Implementing Procedure	5
		BwAP 1110-1	Fire Protection Program System Requirements	44
		BwAP 1110-3	Plant Barrier Impairment Program	39
		BwAR 0-37-A4	Unit One Are Fire	18
		BwOP FP-100	Fire Response Guidelines	25
		BwOP PBI-1	Plant Barrier Impairment Program Pre-Evaluated Barrier Matrix	4
		CC-AA-201	Plant Barrier Control Program	13
		ER-AA-600-1069	High Risk Fire Area Identification	4
		ER-BR-600-1069	Site List of High Risk Fire Areas — Braidwood Unit 1 and Unit 2	0
		OP-AA-201-003	Fire Drill Performance	18
		OP-AA-201-004	Fire Prevention for Hot Work	17
		OP-AA-201-005	Fire Brigade Qualification	11
		OP-AA-201-008	Pre-Fire Plan Manual	4
		OP-AA-201-009	Control of Transient Combustible Material	25
OP-AA-201-012-1001	Operations On-Line Fire Risk Management	4		
71111.07A	Miscellaneous		Unit 0 Component Cooling Water Heat Exchanger OCC01A Eddy Current Examination Final Report	01/2021
	Work Orders	4757035-02	OCC01A: Eddy Current Heat Exchanger	01/28/2021
71111.11Q	Procedures	OP-AA-101-111-1001	Operations Standards and Expectations	26
		OP-AA-101-113	Operator Fundamentals	14
		OP-AA-103-102	Watch-Standing Practices	20
		OP-AA-103-102-1001	Strategies for Successful Transient Mitigation	2
		OP-AA-104-101	Communications	5
		OP-AA-111-101	Operating Narrative Logs and Records	17
		OP-AA-300	Reactivity Management	14
OP-AA0101-113-	4.0 Crew Critique Guidelines	11		

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		1006		
		TQ-AA-10	Systematic Approach to Training Process Description	6
		TQ-AA-150	Operator Training Programs	19
		TQ-AA-155	Conduct of Simulator Training and Evaluation	10
		TQ-AA-306	Simulator Management	10
		TQ-BR-201-0113	Braidwood Training Department Simulator Examination Security Actions	23
	Radiation Surveys	OP-AA-103-103	Operation of Plant Equipment	1
		TQ-AA-201	Examination Security and Administration	18
71111.12	Corrective Action Documents	4398561	2A RCP Seal Injection Flow Change	01/28/2021
		4404934	50.59 SSC Categorization Lessons Learned	02/26/2021
		4405894	0SX205A 1/4-Inch Line 30 dpm Leak, 0SX115C Valve Pit	03/02/2021
		4408016	0SX115C Leak Identified During Sandblasting	03/10/2021
		4408296	Joint Leak Where 0SX115C 30-inch Line Meets 2-Inch YMCI Line	03/11/2021
	Procedures	ER-AA-310-1002	Maintenance Rule Functions - Safety Significant Classification	3
		ER-AA-320	Maintenance Rule Implementation per NEI 18-10	0
		ER-AA-320-1001	Maintenance Rule 18-10 - Scooping	0
		ER-AA-320-1003	Maintenance Rule 18-10 - Failure Definitions	0
		ER-AA-320-1004	Maintenance Rule 18-10 - Performance Monitoring and Dispositioning Between (a)(1) and (a)(2)	1
71111.13	Corrective Action Documents	4396911	Foreign Material Found During New Fuel Inspection	01/20/2021
		4397021	Paragon Model Conservatism Impacting U-1 CC HX RICT	01/20/2021
		4398474	Foreign Material Found in U0 CC HX Drain Line	01/28/2021
		4398552	2CV8425 Diaphragm Leak	01/28/2021
		4398601	2CV8421 Suspected to be Degraded	01/28/2021
		4398967	Lessons Learned U0 CC HX (0CC1A) Clean and Inspect	01/29/2021
		4399523	Elevated Dose Rate Identified for U0/1 CC HX Window	02/01/2021
	Miscellaneous		Final RICT Record for Unit0 CC HX Window	02/02/2021
			Final RICT Record for Unit 1 CC HX Window	02/11/2021
	Procedures	BwMP 3305-009	Disassembly - Reassembly of ITT Grinnell Manually Operated Diaphragm Valves	12
		ER-AA-600	Risk Management	7

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		ER-AA-600-1023	PARAGON Model Capability	10
		ER-AA-600-1042	On-Line Risk Management	13
		ER-AA-600-1052	Risk Management Support of RICT	1
		ER-AA-600-1053	Calculation of RMAT and RICT for Risk Informed Completion Time Program	0
		ER-BW-600-2001	Braidwood RICT System Guidelines	0
		MA-AA0716-004	Conduct of Troubleshooting	17
		OP-AA-108-117	Protected Equipment Program	5
		OP-AA-108-118	Risk Informed Completion Time	2
		OU-AP-200	Administrative Controls During Fuel Handling Activities for Byron and Braidwood	24
		OU-AP-201	New Fuel Receipt and Inspection for Byron, Braidwood, and Ginna	17
		OU-AP-203	Operation of the New Fuel Elevator for Byron and Braidwood	7
		OU-AP-204	Fuel Movement in the Spent Fuel Pool for Byron and Braidwood	16
		WC-AA-101-1006	On-Line Risk Management and Assessment	4
	Work Orders	1478802	1CC01A - Repair of Corroded Unit 1 Component Cooling Water Heat Exchanger Inlet Flanges	02/03/2021
		4757035	0CC01A - Repair of Corroded Unit 0 Component Cooling Water Heat Exchanger Inlet Flanges	01/28/2021
4988286		Reactor Services - New Fuel Receipt	01/12/2021	
5120762		Repair 2CV8425 Diaphragm Leak	01/29/2021	
5120805		Repair 2CV8421 Suspected to be Degraded	01/29/2021	
71111.15	Corrective Action Documents	4395932	Abnormal Noise Identified 1B Emergency Diesel Generator	01/14/2021
		4406038	1AF006A & 1AF017A Water Solid UT NDE Exam Issues	03/02/2021
	Drawings	M-37	Diagram of Auxiliary Feedwater Unit 1 (Critical Control Room Drawing)	BK
	Procedures	ER-AA-600-1012	Risk Management Documentation	14
		OP-AA-106-101-1006	Operational Decision-Making Process	22
		OP-AA-108-111	Adverse Condition Monitoring and Contingency Planning	15
		OP-AA-108-115	Operability Determinations (CM-1)	23

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Work Orders	4990811	IST-FSE-1AF006A/017A/013A-D Train A Auxiliary Feedwater Valves Full Stroke Exercise	03/01/2021
71111.18	Calculations	BRW-02-0030-M	Min Wall Evaluation for Lines 0SX01CA/B/C/D/E/F-30", 0WS02C-60" and 1(2)CW01AA(C)-108"	0
	Corrective Action Documents	4408293	Missed Implementation Action on SX 50.69	03/11/2021
		4410194	NOS ID: UFSAR Change for Recategorized System not Approved	03/19/2021
	Engineering Changes	632945	0SX115C Valve and Piping Carbon Fiber Wrap	0
	Miscellaneous	BR-5069-SX-003	10 CFR 50.69 System Categorization Document - Essential Service Water (SX) System	0 & 1
		BR-5069-SX-20-001	50.69 Integrated Decision-Making Panel (IDP) Meeting Minutes	07/28/2020
		BR-5069-SX-20-002	50.69 Integrated Decision-Making Panel (IDP) Meeting Minutes	08/12/2020
		BW-5069-SX-002	Essential Service Water (SX) Passive Consequence Development in Support of 50.69 Passive Categorization	0
		DIT-BRW-2020-0023	Transmittal of Design Information (TODI) for EC 632945	0
	Procedures	ER-AA-569	10 CFR 50.69 Program	4
		ER-AA-569-1002	10 CFR 50.69 Passive Component Categorization	3
		ER-AA-569-1003	10 CFR 50.69 Risk Informed Categorization for Structures, Systems, and Components	6
		ER-AA-569-1004	10 CFR 50.69 Alternative Treatment Implementation Process	4
ER-AA-569-1005		Integrated Decision Decision-Making Panel for Risk Informed SSC Categorization Duties and Responsibilities	6	
ER-AA-569-1006		Requirements for Immediate, Interim and Periodic Performance Monitoring Reviews	3	
IP-ENG-001		Standard Design Process (EB-17-06)	1	
71111.19	Corrective Action Documents	4402970	2B Emergency Diesel Generator Trip on Incomplete Sequence	02/17/2021
	Procedures	2BwOSR 3.8.1.2-1	2A Diesel Generator Operability Surveillance	50
		2BwOSR 3.8.1.2-	2B Diesel Generator Operability Surveillance	49

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		2		
		2BwOSR 3.8/1.2-1	2A Diesel Generator Operability Surveillance	50
	Work Orders	5086399	Replace Diesel Generator Local Control Panel Kilovac Relays	02/23/2021
		5125461	Replace 2PS-DG110B	02/17/2021
		5127218	2A Emergency Diesel Generator Operability Monthly	02/23/2021
		512934	2B Emergency Diesel Generator Operability Monthly	02/17/2021
		5130977	Letdown Heat Exchanger Component Cooling Controller Failure	03/09/2021
71111.22	Corrective Action Documents	4303972	1B DG 5L Cylinder Temperature TC not Functional	12/15/2019
		4344110	Unit 1 RCS Leak Rate Deviation Action Level I	06/17/2020
		4344858	Unit 1 RCS Leak Rate Action Level Two Deviation	05/21/2020
		4345453	Unit 1 RCS Leak Rate Deviation Action Level III	05/24/2020
		4345579	Unit 1 RCS Leak Rate Exceeds Deviation Action Level III	05/25/2020
		4395932	Abnormal Noise Identified 1B EDG	01/14/2021
	Procedures	1BwOSR 3.4.13.1	Unit One Reactor Coolant System Water Inventory Balance Surveillance	39
		1BwOSR 3.8.1.2-2	1B Diesel Generator Operability Surveillance	47
		2BwOSR 5.5.8.RH.5B	Group A IST Requirements for Residual Heat Removal Pump 2RH01PB	22
		BwOP DG-1	Diesel Generator Alignment to Standby Condition	31
		BwOP DG-11	Diesel Generator Startup and Operation	53
		BwOP DG-12	Diesel Generator Shutdown	30
		ER-AA-321	Administrative Requirements for Inservice Testing	13
71114.02	Corrective Action Documents	04333398	EP-Siren Failure (BW06)	04/07/2020
		04343467	EP-Siren Failure BW28	05/15/2020
		04363003	Siren AC Power Outages (BW16, BW20, BW28)	08/13/2020
71114.03	Corrective Action Documents	04238680	NOS ID: Use EP Qualifications as Designed	04/11/2019
		0429942	Braidwood EP Unannounced 4TH Q Call-In Drill Results	11/22/2019
		04353434	Braidwood EP 6/26/20 Call-In Drill	06/29/2020
	Miscellaneous		ERO Augmentation Drill Reports	March 2019 - December

Inspection Procedure	Type	Designation	Description or Title	Revision or Date	
				2020	
71114.05	Corrective Action Documents	04324463	BRW-EP-2020-NRC-CORP-EOF-Failed Objectives	03/06/2020	
		04332184	NOS ID: EP to Evaluate ORO Comments	04/02/2020	
		04387891	Annual EP Medical Emergency Drill	12/03/2020	
	Miscellaneous			Drills and Exercises Reports	2019-2020
				2021 NRC Emergency Preparedness Graded Exercise Baseline Inspection	02/11/2021
				2020 NRC Emergency Preparedness Graded Exercise Baseline Inspection	01/30/2020
		04236364		Braidwood EP OYE Additional Comments for the CR and EOF	04/04/2019
		EP-AA-124-1001-F-07		Alternative Facility/ Liaison Kit Inventory	01/01/2019 – 12/31/2020
		EP-MW-124-1001-F-02		CR/Simulator/TSC/OSC Equipment Test - TSC Software and Reference Document Inventory	01/01/2019 – 12/31/2020
		EP-MW-124-1001-F-03		Technical Support Center Inventory	01/01/2019 – 12/31/2020
		EP-MW-124-1001-F-04		Operations Support Center Inventory	01/01/2019 – 12/31/2020
		NOSA-BRW-19-03		EP Audit Report	04/17/2019
		NOSA-BRW-20-02		EP Audit Report	04/08/2020
71114.06	Procedures	EP-AA-1000	Standardized Radiological Emergency Plan	33	
		EP-AA-1001	Radiological Emergency Plan Annex for Braidwood Station	35	
71124.02	Corrective Action Documents	AR 04304548	Dose Excellence Plan of Action	12/17/2019	
		AR 04337024	MMD Individual Receives Unplanned Dose Alarm	04/20/2020	
		AR 04337390	Loss of LDBP May Lead to Higher Dose Rates for A2R21	04/21/2020	
		AR 04350103	RP-AA-400-1002 Dose Equalization Actions	06/13/2020	
	Radiation Work Permits (RWPs)	BW-02-20-00613		Radiation Work Permit BW-02-20-00613 and Associated ALARA Documentation for Reactor Disassembly and Reassembly	Multiple Dates
		BW-02-20-00614		Radiation Work Permit BW-02-20-00614 and Associated ALARA Documentation for Reactor Head/Upper Internal Moves	Multiple Dates

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		BW-02-20-00619	Radiation Work Permit BW-02-20-00619 and Associated ALARA Documentation for Nuclear Instrumentation Under-Vessel Activities	Multiple Dates
		BW-02-20-00645	Radiation Work Permit BW-02-20-00645 and Associated ALARA Documentation for 2 Alpha Reactor Coolant Pump Motor/Pump Replacement	Multiple Dates
71151	Corrective Action Documents	04396237	NRC Participation PI Corrections	01/15/2021
	Corrective Action Documents Resulting from Inspection	4403396	NRC Observations During Review of LS-AA-2010 and 2030	02/19/2021
	Miscellaneous		NRC Performance Indicator Data; Initiating Events – Unit/Reactor Shutdown Occurrences	01/01/2020 – 12/31/2020
			NRC Performance Indicator Data; Initiating Events – Unplanned Power Changes per 7000 Critical Hours	01/01/2020 – 12/31/2020
			NRC Performance Indicator Data; Emergency Preparedness – Alert and Notification System	01/01/2020 – 12/31/2020
			NRC Performance Indicator Data; Emergency Preparedness – ERO Participation Drill	01/01/2020 – 12/31/2020
			NRC Performance Indicator Data; Emergency Preparedness – Drill/Exercise Performance	01/01/2020 – 12/31/2020
	Procedures	LS-AA-2001	Collecting and Reporting of NRC Performance Indicator Data	16
		LS-AA-2010	Monthly Data Elements for NRC/WANO Unit/Reactor Shutdown Occurrences	5 – 6
		LS-AA-2030	Monthly Data Elements for NRC Unplanned Power Changes per 7000 Critical Hours	5 – 6
71152	Procedures	NO-AA-10	Quality Assurance Topical Report (QATR)	96
		PI-AA-120	Issue Identification and Screening Process	11
		PI-AA-125	Corrective Action Program (CAP) Procedure	7
71153	Corrective Action Documents	4374128	P2301 Indication Suspect	10/03/2020
	Procedures	BwMP 3305-003	Main Steam Safety Valve Testing Using Setpoint Verification Device	3 – 5